# CS 2LC3

**Assignment #1. Due October 3 (Monday), 2022, 23:59 via Avenue. This assignment is easy but labour-consuming. Start early! Do not hesitate to discuss the problems with TA or instructor as soon as you discover them.**

**Total: 127 pts**

**Instructions: For all assignments, the students must submit their solutions to**

**Avenue → Assessments → Assignment #**

**Students can solve the exercises on paper, use a smartphone app called CamScanner, convert their entire solution into a single PDF file, and submit it to Avenue. The maximum upload file size is 2 GB in Avenue for each submission.**

**Please make sure that the final PDF file is readable.**

**Students, who wish to use Microsoft word and do not have Microsoft Word on their computer, are suggested to use google document editor (Google Docs). This online software allows you to convert your final file into a PDF file.**

**There will be a mark deduction for not following the submission instruction.**

Please first finish the assignment on your local computer and, at the end, **and attach your solution as a PDF file.**

**You will have an unlimited number of submissions until the deadline.**

**Students must submit their assignments to Avenue.** ***Any problem with Avenue, please discuss it with Mahdee Jodayree <mahdijaf@yahoo.com>, the lead TA for this course.***

**Questions.**

1.[2] Exercise 1.2(f) (page 21 of the Gries-Schneider textbook).

2.[2] Exercise 1.4 (page 21 of the Gries-Schneider textbook).

3.[2] Exercise 1.7(e) (page 21 of the Gries-Schneider textbook).

4.[2] Exercise 1.9(a) (page 22 of the Gries-Schneider textbook).

5.[2] Exercise 1.11(e) (page 22 of the Gries-Schneider textbook).

6.[6] Exercise 2.1 (page 38 of the Gries-Schneider textbook), questions (k), (l) and (m).

7.[4] Exercise 2.2 (page 38 of the Gries-Schneider textbook), questions (g) and (h).

8.[4] Exercise 2.3 (page 38 of the Gries-Schneider textbook), questions (f) and (g).

9.[4] Exercise 2.5 (page 39 of the Gries-Schneider textbook), questions (d) and (e).

10.[6] Exercise 2.7 (page 39 of the Gries-Schneider textbook), questions (h), (i) and (j).

11.[10] Exercise 2.9 (pages 39-40 of the Gries-Schneider textbook).

12.[6] Exercise 2.7 (page 39 of the Gries-Schneider textbook).

13.[3] Show that in a Boolean algebra, every element $x$ has a *unique* complement $\neg x$ such that $x \vee \neg x = true$ and $x \wedge \neg x = false$.

14.[6] Any Boolean expression can be interpreted as a *Boolean function*. For example:
$x \vee (\neg y \wedge z)$ is a Boolean function $f$: $\mathcal{B} \times \mathcal{B} \times \mathcal{B} \rightarrow \mathcal{B}$, $f(x,y,z) = x \vee (\neg y \wedge z)$.

How many different Boolean functions $f(x,y,z)$ are there so $f(\neg x, \neg y, \neg z) = f(x,y,z)$ for all values of the Boolean variables $x, y, z$?

15.[3] Exercise 3.4 (page 62 of the Gries-Schneider textbook)

16.[3] Exercise 3.6 (page 62 of the Gries-Schneider textbook)

17.[3] Exercise 3.12 (page 62 of the Gries-Schneider textbook)

18.[3] Exercise 3.13 (page 62 of the Gries-Schneider textbook)

19.[3] Exercise 3.17 (page 63 of the Gries-Schneider textbook)

20.[3] Exercise 3.18 (page 63 of the Gries-Schneider textbook)

21.[3] Exercise 3.22 (page 63 of the Gries-Schneider textbook)

22.[3] Exercise 3.24 (page 63 of the Gries-Schneider textbook)

23.[3] Exercise 3.32 (page 64 of the Gries-Schneider textbook)

24.[3] Exercise 3.34 (page 64 of the Gries-Schneider textbook)

25.[3] Exercise 3.43 (page 64 of the Gries-Schneider textbook)

26.[3] Exercise 3.45 (page 64 of the Gries-Schneider textbook)

27.[3] Exercise 3.48 (page 65 of the Gries-Schneider textbook)

28.[3] Exercise 3.51 (page 65 of the Gries-Schneider textbook)

29.[3] Exercise 3.76 (page 66 of the Gries-Schneider textbook)

30.[3] Exercise 3.78 (page 66 of the Gries-Schneider textbook)

31.[10] Exercise 5.5 (page 105 of the Gries-Schneider textbook)

30.[10] Exercise 5.6 (page 105 of the Gries-Schneider textbook)